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## DISCUSSION

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The message I have to deliver is from one engine manufacturer, Navistar International Transportation Corporation. We may be only one OEM, but Navistar builds more diesel engines in North America than any other OEM. For this reason, I believe our voice should be heard and our comments considered.

Navistar is in basic accord with Mr. Springer's proposal. We recognize that in the current form this is a broad brush proposal, but we see potential in this plan. Let us list some advantages derived from more stringent diesel fuel regulations:

I. Protection of the environment by the reduction of harmful exhaust emissions.

The control of diesel fuel properties such as sulfur content, cetane number, and aromatic content reduces hydrocarbon, particulate, and NO<sub>x</sub> emissions.

II. Fuel quality impacts on the ability of diesel engines to maintain emissions control throughout the useful life of the engine.

Some examples of this point are:

(i) To meet '94 emission requirements we expect to use exhaust aftertreatment (catalytic converter). High sulfur-containing fuels can poison the converter's catalyst.

(ii) Fuels can require detergent additives to prevent fuel injector deposits that can reduce an engine's emission control and performance.

(iii) Fuels can require lubrication additives to prevent fuel pump wear. Excessive fuel pump wear will adversely affect both emissions and performance.

III. Fuel quality affects the sociability or customer satisfaction with diesel engines.

The number one field problem that we encounter with our light-duty diesel engines is cold-weather starting. Frequently this difficulty can be traced to fuel quality. The so-called

POLLUTANT	PROTOTYPE DIESEL (G/BHP-HR.)	PROTOTYPE* METHANOL (G/BHP-HR.)	1994 EMISSION STANDARDS (G/BHP-HR.)	
			HEAVY-DUTY DIESEL	HEAVY-DUTY METHANOL*
PM	.08	.12	.10	.10
HC	.30	1.6	1.3	1.3
NO <sub>x</sub>	4.44	3.6	5.0	5.0
CO	1.37	6.4	15.5	15.5
F*	.047	.16	None	.05

\* Formaldehyde Standard For 1995 Model Year

\* Engine Out Data, No Catalytic Converter Aftertreatment

Fig. 6 DTA-466 prototype emission performance

winterized or climatized 2-D fuel often proves to be inadequate.

Fuel properties also influence such performance parameters as fuel consumption, engine output, and engine quietness.

Fuel storage additives need to be considered in order to ensure that diesel fuels will provide satisfactory performance upon demand.

IV. Elimination of the need for alternative fuels, such as methanol, to protect the environment.

We have come a long way with our technology to reduce engine emissions. Navistar has already demonstrated compliance to 1994 emission requirements with a DTA-466 prototype engine. Figure 1 shows these test results and compares them to our efforts with diesel engines fueled with methanol. Even after the prototype methanol engine test results are corrected for the absence of a catalytic converter, the prototype diesel engine still emits reduced or equivalent emissions in all categories except NO<sub>x</sub>.

Navistar believes that it can design a diesel engine fueled with a controlled diesel fuel that will be more friendly to the environment than a diesel engine fueled with methanol. But, in developing a clear mandate for diesel fuel over methanol, the additional help provided by more stringent controls on diesel fuel may be required.

Navistar believes that Mr. Springer's plan is feasible with the cooperative efforts of the engine and petroleum industries. We see similarities between fuels and the efforts that have been made with their sister petroleum product, engine oil. The Lubricant Review Institute (LRI) has proven to be successful in qualifying engine oils for military use. This system has also been used to enhance the commercial credentials of engine oils not intended for the military. Also, the MVMA is developing a system for engine oils that parallels Mr. Springer's suggestions for fuels. The extension of this thinking from engine oils to fuels is workable.

Mr. Springer's paper provides only a skeleton from which to build a diesel fuel qualification system. However, Navistar supports the concept and would be willing to work with both the engine and the petroleum industries in putting flesh on this skeleton. Such cooperation between the two industries would seem beneficial in light of the current push on the part of regulators for alternate fuels. In reality, reformulated gasoline and diesel fuels may offer, at a much lower cost, the same or better air quality benefits as methanol.

### Author's Closure

The main objective of this paper was to begin a debate about reformulated gasoline and diesel fuels by asking ques-

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tions such as: What must a reformulated fuel demonstrate to be considered as good as the "clean" alternative(s)? Can reformulated fuels compete environmentally as well as economically? What assurance does a refiner have in recouping his significant capital investment? Can manufacturers, refiners, and government come together over this issue considered by many to dominate the decade of the 1990s?

To all these questions there will be many possible answers. Since preparing this paper, the U.S. automakers and twelve refiners have begun Phase I of a significant program to understand what is possible with reformulated gasoline in modern, emission-controlled cars versus alternatives such as methanol. This and related work will provide the basis for technical comparisons and judgments.

The qualification of gasoline and diesel fuel, as described in this paper, is one of many ways to get reformulated fuels into the marketplace and keep them there. If it is found that it is

not economically or technically possible for reformulated fuel to compete with the "clean" alternative(s), there are a number of in-between scenarios to consider. What if, for example, a reformulated fuel could achieve only half the emissions reductions of the "clean" alternative but could be put into effect twice as fast and affect twice as many vehicle miles traveled? Then, there may be a way to make this fuel available in the nine nonattainment regions in the U.S. as soon as practical at a price that will not discourage its use versus other fuels. The next few years will see many recipes for reformulated fuels as well as arguments for and against their use.

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